

# Library Automation in India

A. Lakshmana Moorthy

Technical Information Centre, Defence Research & Development Laboratory, Hyderabad-500 058

## 1. INTRODUCTION

### 1.1 Growth of Computers in the Country

Computerization had its beginnings in India when punch cards were used during the late 1950s and early 1960s. Computerization activities can be said to have started in India in 1955 with the installation of the first computer system HEC-2M at the Indian Statistical Institute (ISI), Calcutta. A second computer Ural, also installed at ISI in 1958 (Saxena, *et al*, 1988) followed this. In 1960s computers arrived in India. Mini computers started penetrating the market in late 1970s while microcomputers were introduced in the 1980s in the country. However, due to the high cost of mainframe and mini computers, use of punch cards continued till 1980s. The shift from punch cards took place only after the advent of microcomputers, which were generally cheaper than the mainframes, and the minis and many institutions could buy them.

The period between 1955-65 can be called as introductory phase during which 16 computers were introduced in the country. The second phase of 1965-72 can be termed as consolidation phase, 170 computers were installed in India by 1972. IBM had a lion's share (60-75 per cent) of the computers installed in the country in these phases. About 120 third and fourth generation systems were imported in to the country during 1976-81. ISI and Jadavpur University jointly designed and developed the first indigenous computer ISIJU that was installed at Jadavpur University in July 1964. However, the commercial production of indigenous computers started only in 1973 when the Electronic Corporation of India Ltd (ECIL) started manufacturing during 1973-78, it installed 94 computers in the country. The Indian computer industry has grown at a rate of about 10 per cent per year during late 1970s.

Until 1985, India's contribution to computers and telecommunication technologies was practically nil. The main reasons are the non-receptive government policies and hostility from trade unions. This is why the computer revolution of the 1970s which marched ahead with full steam not only in the West but also in neighbouring countries like Singapore, Taiwan, Hong Kong, South Korea, Thailand and Malaysia, did not have a foot hold in India. With the government formed in 1984 adopting technology-friendly policies, the situation started improving slowly. In 1966 the Hindustan Computers Ltd (HCL), launched a price war in microcomputers and the computer market in the country started growing. Many new companies rushed to encash the trend. By 1988 there were 250 manufacturers in the field. The total number of computer systems increased from 120 in 1970 to around 448 in 1978 and to 600 in 1980 (Banerjee, 1992; Saxena, *et al*, 1988); this rose to 2000 computers in 1984 which saw a five fold rise to reach 10,000 in 1985 and about 1 lakh by the end of the Seventh Plan (Mehra, 1988). There was a steady growth in the computer industry in the late 1980s. In 1984 India had an installed base of 9,100 computers out of which 4,050 were manufactured in the country. By 1986, this number rose to 52,150 and 22,150, respectively (Singhal and Rogers, 1989, p. 190-193). Fierce competition brought down the microcomputer prices. Still only elite institutions could buy them.

Liberalized economic policy of the government and application of information technology saw the all round growth of the computers industry during the Eighth Plan (1992-97). During this period the computer industry got impetus from the new computer policy announced by the Department of Electronics (DOE), Govt of India in November 1994. The number of low cost PC-based networks and LANs increased. There were an estimated 1,00,000 e-mail users in the country in 1995 which was expected to be doubled by the end of Eighth Plan. Production of computers using Intel's Pentium processor stabilized and many key sectors like Banking, Railways, Airlines, Oil, Power, Defence, Coal, S&T, Steel, and Education have started to induct computers during this period. The Indian computer industry has grown at a rate of about 10 per cent per year during late 1970s. In 1985 the production of computers had reached Rs 2000 million. The Ninth Plan document of DOE expects to achieve a production value of Rs 178.5 billion by the year 2001-02, with a cumulative growth of 46 per cent per annum.

In the recent years, the production of PCs has registered a phenomenal growth. The 286s, 386s and the 486s were taken out of production line. During 1996-97 a total of 4,67,387 PCs were

produced of which more than 50 per cent (2,77,396) were Pentiums. In 1999, the country had an installed base of about 3.2 million PCs of which about 56 per cent (1.8 million) are 386 and above (*The Times of India*, 11 June 1999, p. 17). This base is expected to reach 4.47 million in 2000 and 9.64 million by the year 2002. It has been estimated that about 50 per cent of home PCs sold are machines priced below Rs 40,000. In 1998, about 1,65,000 PCs were sold with expected sales of 3,14,000 PCs in 1999 and about 5,00,000 in the year 2000.

In the late 1990s, the computer industry (both hardware and software) has attained maturity. This is the result of the new computer policy of 1994, the IT-friendly measures of the government including the IT Action Plan, and the realization of the necessity of automation in all walks of life. During the year 1994-95 the growth was 60 per cent over the previous year; in the following year (1995-96) it was 50 per cent. In recent past, the small and medium enterprises and the home market gained momentum and the falling prices helped boost sales. Although the growth in 1997-98 was only 20 per cent due to the slow economic growth and instability, it picked up in the subsequent year and registered a growth of 32.4 per cent.

Although these statistics are encouraging, the PC density (number of PC's per 100 population) in the country is too low to be happy. This figure indicates the usage of PCs in various activities such as business, marketing, information retrieval, electronic messaging, e-mail, file transfer, and shows the extent of the penetration of computer culture in the society. As per the International Telecommunications Union (ITU), in 1995 India had only 0.1 computers per 100 people or one computer for every 1000 population (ITU, 1995). This rose to 0.2 in 1998 and is expected to reach 2 by the year 2008. The developed countries have 10 PCs and above with USA and Switzerland leading with PC densities of 29.7 and 28.8, respectively. However, the falling prices of the PCs because of fierce competition between firms to have a niche in the market resulted in reduced value of sales. Unlike the initial brands (like PC-XT, 286 and 386) the prices of latter brands like PC 486 and Pentium fell steeply. In just two years (1994-96) the prices of Pentiums fell steeply from about Rs 2,00,000 to 45,000 finally settling around Rs 30,000, the average selling value of a PC in 1999. Currently a Pentium 4 with 1.5 GHz clock speed desktop sells at around Rs 45,000. All these resulted in increased computer literacy and made the computerization a reality in all sectors in India.

## **1.2 Development of Library Automation Software in India**

While the software industry is a well organized sector, library software is largely confined to some premier institutions and their libraries. It is only recently that private sector entered this field. Even then, the aggressive marketing efforts as in the case of computer software are not there. Many of the library automation efforts using in-house expertise were around the existing PCs and software packages including dBase, and FoxPro. In some cases, high level programming languages like COBOL, BASIC, C, C++ and Pascal were used. Initially, only simple and important functions such as acquisitions, circulation and cataloguing only were automated; integrated packages were thought at a later date. These efforts generally led to the development of a total integrated system (as in ISAC and DESIDOC), or were used to convince the authorities to purchase a library automation software from the market. In some cases, the vendor of the library automation software helped to convert the automated data into a compatible form for use with the new software. Firms like LibSys undertook creation of bibliographic records of the library holdings. Both the MARC and CCF formats are used now to develop bibliographic databases.

After the introduction of CDS/ISIS software package of Unesco in Indian libraries in the mid-1980s, NISSAT organized a number of training programmes on application of CDS/ISIS to library activities in 1990s. These courses, besides training the professionals in using the software, have made them aware of the benefits of library automation and also introduced computer culture among the LIS professionals. This also gave impetus to many institutions for developing their own library software suitable for their libraries with special emphasis on the routines and services important to the institution. Thus began the indigenous efforts towards developing integrated library software packages in the country.

Some of the special libraries such as those at Bharat Heavy Electricals Ltd (R&D), Steel Authority of India Ltd (SAIL), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), INSDOC, NIC, DESIDOC, and IIT, Kanpur have successfully developed software for library automation. Specific mention is to be made of DESIDOC, which has developed three software

packages. The first was named the Defence Library Management System (DELMS) and was developed in COBOL under multi-user Unix environment. This software was provided to the DELNET, and later to INFLIBNET under the name ILMS, Integrated Library Management System. While DELNET switched over to Libris and DELSIS subsequently, INFLIBNET has developed a new soft package SOUL, Software for University Libraries. DESIDOC also developed a software package for NISSAT called Sanjay, an integrated library management software using Unesco's CDS/ISIS in Pascal language. Later DESIDOC developed *Suchika*, an integrated software package in C++ language. The first version was developed in DOS and Unix platforms to suit small and large libraries. Later, *Suchika* version 2 was also developed on Windows NT platform. The Computer Maintenance Corporation Ltd (CMC), a public sector company specialized in computers, developed an integrated software package called *Maitrayee* suitable in library network environment. The software was developed with NISSAT support for CALIBNET. INSDOC initially developed CATMAN to support cataloguing in the National Science Library. Recently, it developed *Granthalaya*, an integrated library automation software package.

These institutional efforts inspired the software developing firms in private sector with the result that now many commercial software packages have been developed and marketed. Appendix 1 lists some software packages currently available in the country; the list is only indicative and not exhaustive.

## 2. LIBRARY AUTOMATION ACTIVITIES IN INDIA

Although some institutions like ISI and IITs in the country have imported mainframe computers in the late 1950s and early 1960s, priority was being accorded for productivity- and R&D-linked jobs. This is because of the huge costs involved in getting mainframes and also due to the fact that library work was generally viewed as not so important by the concerned authorities who accorded lower priorities in allotting computer time for such work. Many of the libraries and information centres started using computers for their work after the introduction of mini computers during late 1970s. Even these were generally costly, only elite institutions in the public, academic, R&D and private sectors could afford them and so, the libraries in these institutions were able to utilize them to some extent. Library automation, as a result, did not progress satisfactorily. However, the arrival of microcomputers and personal computers (PCs) in the Indian market in the 1980s gave the necessary impetus; the environment began to change and library automation picked up momentum.

The Indian National Scientific Documentation Centre (INSDOC), one of the pioneer institutions in library automation field, started using computers for information processing in 1964 utilizing the IBM 1620 at IIT, Kanpur for its union catalogue. It also utilized the IBM 1620 at Delhi University for other related jobs. The Documentation Research and Training Centre (DRTC), Bangalore also started the computerization work in the late 1960s. A Document Finding System was designed and developed with programs to prepare catalogues on tape which was later tested on the IBM 1401 system at ISI, Calcutta. In 1970, the library of NAL, Bangalore made efforts in computerizing the circulation control with an ICL 1004 system. As per a survey conducted by Kamath (1990), there were nine libraries which were using computers in the country. The various library routines where computerized procedures used by these libraries include: procurement (one library), charging and discharging of documents (one library), cataloguing (two libraries), preparing union catalogue (one library), and preparing addition lists (four libraries). INSDOC started providing computerized SDI service from January 1976 using the IBM 370/155 computer at IIT, Madras and the CAN/SDI software with CA Condensates database. INSPEC A&B databases were also used from 1977 for providing SDI services. In 1977 BHEL (R&D), Hyderabad started providing SDI services to the various units using computers. During 1970s a few more libraries started using computers for library routines. Notable among them include the Tata Institute of Fundamental Research (TIFR), Mumbai and the Space Applications Centre (SAC), Ahmedabad. A number of seminars and workshops were conducted on various facets of library automation during this period by national institutions like SIET, DRTC, BARC, and INSDOC.

This situation improved in the 1980s and the early 1990s with the launching of national and metropolitan networks. Further, during this period the prices of the computer hardware and software have started climbing down making them affordable to many libraries. Metropolitan networks like CALIBNET and DELNET, professional associations like ILA, AGLIS and IASLIC, and national institutions like INSDOC, DRTC, and SIET started training programmes in automation of libraries, bibliographic database development using CDS/ISIS and other software packages. National institutions like DRTC, INSDOC and DESIDOC, were actively engaged in such programmes. INFLIBNET of UGC started providing financial assistance to the academic libraries for library automation. Agencies like

NISSAT also supported such activities. The INFLIBNET has, supported 123 universities/deemed universities towards creating infrastructure facilities including buying PCs and modems, developing databases, and getting telephone and Internet connectivity. It is also providing recurring grants for some activities for 5 years after the initial grant is utilized. INFLIBNET expects to extend financial support for another 30 universities in the coming couple of years. These efforts paid rich dividends and resulted in a significant level of automation of academic and research libraries in the 1990s.

The main players in library automation in the past decade have been the special libraries of the country. Most of these library and information centres are in the R&D institutions under the central government and in universities. These include the Council of Scientific and Industrial Research (CSIR), Department of Atomic Energy (DAE), Defence Research and Development Organization (DRDO), Department of Science and Technology (DST), Indian Council of Agricultural Research (ICAR), Indian Council of Medical Research (ICMR), Indian Space Research Organization (ISRO), Public Sector Undertakings (PSUs) and the institutions of national importance like IITs, Indian Institute of Science (IISc), All India Institute of Medical Sciences (AIIMS), and National Medical Library. Although special libraries took the lead initially, many university libraries and libraries from major institutions in arts, humanities, social and behavioural sciences, and management are increasingly participating in library automation.

Some special factors favoured special libraries, which were able to undertake library automation. These include: (i) easier decision making due to the relative autonomy they possess being in publicly-funded organizations, (ii) the pressure these libraries experience to provide efficient services and better, wider access to information (this pressure is the result of the goals or deadlines to be achieved by the institution), (iii) the wide availability of PCs, and (iv) the free availability of Unesco's Micro CDS/ISIS which facilitated easy development of databases (Haravu, 1993). Another factor is that in many of the institutions, internal talent was available in the form of computer specialists (programmers) who were responsible for the in-house development of library software. A detailed discussion of the benefits, prerequisites modules and files needed for library automation can be found elsewhere (Rao, 1990 and 1995; and Seth and Dalal, 1995).

### 3. SOME LIBRARY SOFTWARE PACKAGES AVAILABLE IN INDIA

The library application software, integrating all the activities and routines of the library is an essential software for the libraries. There are many integrated library management packages available in the market suiting to the needs as well as budgets. They range from Rs. 10,000 to 6,50,000. Many are also available in multi-user network versions. Many authors have attempted comparative study, evaluation and selection criteria for Indian software packages (see for example, Malwad, 1995; Patel and Bhargava, 1995; and Saxena and Srivastava, 1998). Chowdhury and Chowdhury (1994) reported 19 software packages used for the automation of library activities in 1994. A brief account of some of the well known software packages is presented in the following paragraphs:

#### 3.1 Alice for Windows

Soft Link's Alice (Windows version) is a fully integrated library management solution. The DOS version is known by OASIS. Alice for Windows is the complete library automation toolkit, which incorporates the latest information technology, and functional depth, provides a complete range of library functions using discrete modules, and allows select modules that suit the individual library need. It has wide usage and currently being used by more than 8,700 libraries all over the world. In this dynamic world of information, it follows constant features upgrade enabling to meet all kind of requirements of all range of libraries. Modules are grouped into Standard modules, Advance modules and Special modules.

**Standard Modules** are required for a library to function from day to day. These are: Management, Reports and Utilities, Circulation and Inquiry (OPAC). **Advance Modules** extend the usability of the automated library. These are: Acquisitions, Periodicals, Communications, Guidelines, Journal Indexing and Remote Inquiry. **Special Modules** are available for those libraries which have a specialized need. These are: Advanced Bookings, Book Review, Cooperative Cataloguing, Multimedia, Multi Lingual, Patron Self Checking, Rapid Retrospective, Remote Cataloguing, Resource Rental, Technical Manual, User Access Menu, User Definable MARC, Web Inquiry, Books Hire, CD-ROM Loader, Fines, Library

Service, Interlibrary Loans, Professional Inquiry, Records Management, Report Generator, Self Circulation, Union Catalogue, User Definable Databases, Book Wizard Cont, Mobile Circulation

## Features

- It has four versions: Academic Library, Special Library, Public Library, and School Library versions.
- It runs on Standalone PCs irrespective of the platform including Windows, Novell, Linux, with an Apple Mac version.
- It supports Z39.50 clients/server architecture, GUI, Intranet inquiry and system functions; Internet inquiry functions for operating systems including UNIX.
- Export and import of data in MARC formats and data conversion from CDS/ISIS, dBase, FoxBase, and from any other standard library software.
- It is multilingual and can work with such languages as English, Russian, Japanese, Chinese, Arabic, Spanish, French, Malaysian, Vietnamese, Thai, Hindi and other Indian languages.
- The software is being continuously upgraded; one or two upgrades are being released every year.

## 3.2 CDS/ISIS

CDS/ISIS stands for Computerized Documentation Services/Integrated Set of Information Systems. CDS/ISIS is an advanced non-numerical information storage and retrieval software developed by Unesco since 1985 to satisfy the need expressed by many institutions, especially in developing countries, to be able to streamline their information processing activities by using modern (and relatively inexpensive) technologies. The software was originally based on the Mainframe version of CDS/ISIS started in the late '60s, thus taking advantage of several years of experience acquired in database management software development.

CDS/ISIS is a menu-driven generalized Information Storage and Retrieval system designed specifically for the computerized management of structured non-numerical databases. One of the major advantages offered by the generalized design of the system is that CDS/ISIS is able to manipulate an unlimited number of databases each of which may consist of completely different data elements. Although some features of CDS/ISIS require some knowledge of and experience with computerized information systems, once an application has been designed the system may be used by persons having had little or no prior computer experience. For advanced users having access to computer professionals, CDS/ISIS offers an integrated programming facility allowing the development of specialized applications and/or the functional extension of the software as originally provided.

It has the largest installed base of about 1390 installations (Kittur, 1998, p. 4) and is a PC version available on a number of platforms like Windows 95, Windows NT, DOS, Claris etc. It has a number of fields, records, alternate scripts, multimedia capability, and Web interface. Many specialized application products have been developed around CDS/ISIS (*Sanjay* and *Trishna* library software packages, for example). Besides in libraries, the package can be equally used to create databases. An ideal software package for small and medium-size libraries, it was distributed free of charge initially; now it is priced at Rs 1500/-. The package performs a variety of operations related to information storage and retrieval with powerful search capabilities and flexible database management. It allows interlinking records from more than one database, use of more than one data sheet, and conforms to ISO-2709. The major functions provided by CDS/ISIS allow you to:

- Define databases containing the required data elements
- Enter new records into a given database
- Modify, correct or delete existing records
- Automatically build and maintain fast access files for each database in order to maximize retrieval speed
- Retrieve records by their contents, through a sophisticated search language
- Display the records or portions thereof according to your requirements
- Sort the records in any sequence desired
- Print partial or full catalogues and/or indexes
- Develop specialized applications using the CDS/ISIS integrated programming facility.

**Database Menu:** The bottom part of the menu normally contains the list of the most recently opened databases. You may open any one of them by simply clicking on the corresponding entry. It also allows you to import data from external files recorded according to the ISO-2709 standard format for information interchange and also to extract a database or a portion thereof normally for transmitting it to other users. You may also use this command to perform some reformatting of the records of a database and then use the import function to store the reformatted data into the original or a different database. It also allows you to print the output of a given query and/or to print a selected range of records.

**Browse Menu:** It allows the whole database to be browsed or edited independently from any search performed; displays the list of searches performed so far, from which you may select the one desired. It also facilitates in displaying the record (according to the currently selected format) or displaying either the current format or the current record in ASCII.

**Search Menu:** It provides Expert Search and Guided Search--for a simplified search interface, and saving the search results. Saved searches can be recalled. **Edit Menu:** This facilitates data entry, deleting a record, copying records in ASCII or rich text format. **Configure Menu:** This allows you to change the language in which menus, windows, prompts and system messages will be displayed. When you select this, a list of available languages is displayed from which you may select the one desired. Once selected, a language remains in effect until you change it again. It allows display of the current parameter settings.

**Utilities Menu:** This allows you to add or delete a field with a specified contents to a range of Master file records. It also allows to add or delete or replace a field with a specified contents to all the records retrieved by a given search. **Windows Menu:** It arranges windows so that they overlap, starting in the upper-left corner of the main CDS/ISIS window. **Help Menu** provides helps in troubleshooting while working with the software.

**Windows Version (WINISIS):** The Windows version (compatible with Windows 3.1x, 95, 98, Me, NT4 and Win 2000), version 1.4 was released in January 2001 has been totally re-written in C++ language (as against Pascal in DOS and Unix versions). This move provides a common standardized language for all platforms - DOS, Windows, Unix etc. This reduces maintenance costs, increases portability, and renders implementation of client-server architecture easy. No conversion is needed when moving from CDS/ISIS DOS to CDS/ISIS for Windows. Same database and inverted files of DOS can be used here. Some changes in formatting language and displays however occur (Vyasamurthy, 2001). It includes all the features of the MS-DOS version except some database utilities such as the database re-initialization. It is designed for current MS-DOS users who wish to migrate to the Windows environment, as well as for new users.

### 3.3 DELMARC and DELPLUS

DELPLUS (formerly DELSIS), an integrated modular package, was developed on Basis plus by DELNET to support complex cataloguing and union catalogue functions under network environment. The software provides interface to CDS/ISIS and supports creation of bibliographic records in 13 Indian languages (using GIST card). It facilitates duplicate checking, online help and interlibrary loan. Currently it supports all the DELNET databases catering to all the network users. The software is ISO-2709 compatible. While DELMARC is designed for bigger libraries that have collections of more than one lakh, DELPLUS is designed for all types of small libraries with a collection of up to one lakh.

**DELMARC Ver.1.0.0:** This software is offered to Member-Libraries of DELNET with a collection of books up to 1,00,000 at a subsidized price of Rs. 15,000.

#### Special Features:

- Software is compatible with bar code technology.
- It is designed and developed exclusively to work in all kinds of libraries including public libraries, academic libraries and special libraries.
- Multi-user facility allows different branch libraries/sections/nodes of a library to function together.
- Free up gradation available.

- Follows internationally recommended standards and formats such as US-MARC, MARC21, UNIMARC, and UK-MARC.
- Provision for backlog entry, backup and restore facility and bar coded stock verification facility.
- Provides lists of country and language codes and also online help.

DELMARC manages libraries with extensive collections, complex operations and serves a large clientele. This software has been designed after a comprehensive study of different library-related functions performed in different kinds of libraries. This software is easy to work with and offers the Acquisition, Cataloguing, Circulation, OPAC, Administration, Export/Import, Authority Control Article Indexing Report Generation modules. The module for Serials Control is being tested and will be released soon.

**Acquisition:** The acquisition module enables library staff to handle the following major function related to acquisition of library material: Suggestions management, Approvals, Ordering, Cancellation and Reminders, Receiving of Documents, Accessioning, Management of Vendors, Publishers and Currency Tables.

**Cataloguing :** Cataloguing of any type of material in any MARC format using AACR II rules, Category of material like reference special, etc. can be defined, The shelf No. Can also be given to the item that will be useful in stocktaking, Cataloguing of Multiple Copies, Copy of a record, Backlog Entry facility (Retro-Conversion facility).

**Circulation:** Takes care of all possible functions such as issue, return, reissue, reservation, etc. Member enquires and maintenance of the status of materials can be handled. Complex functions like fine management for each category of users and material can also be effectively carried out. Issue, return or reserve items by Accession No. as well as by Title, Author, etc. and Overdue charges.

**OPAC:** Individual search (by Author, Title, ISBN, Accession No., Subject, Class No., etc.), Boolean search, special search (for cataloguing purposes), are possible. Provides the new arrivals' list, online reservation of new arrivals or other titles. Results can be seen/printed in AACR-2 format or any MARC format described above.

**Administration:** Can define the Member Categories, Member Groups, Currencies and their exchange rates, Acquisition Modes, Payment Modes, Material Categories, Miscellaneous Services, Select/Unselect MARC tags, holidays, user passwords, etc. that will be used throughout the functioning of the software. Administrator can delete data or restore the deleted data like Members' Records, Vendors' Records, Catalogue Records, etc., Generation of Report., Allotment of privileges to members, SDI facility, Other operations like Receipt Block Generation, setting the members' Photo File Format,

**Export/Import:** Export/import of data into/from any standard MARC format. **Authority Control** enables to maintain Author, Title, Series and Subject Authorities and links with the records. **Article Indexing** maintains a database of various articles indexed in the library or collected from outside sources. **Member's/Vendors' Maintenance** can add, edit or delete the member's/vendor's data. Member's photo is automatically picked up from the directory once scanned. **Reports:** A wide range of reports are generated including Vendors' List, Ordered Materials, Received Material, Overdue Orders, Missing Items, Written-Off Items, Reserved Items, Issued Items, Members' List (Brief/Detailed), Stock Verification, Reminders and Intimations, etc. Reports can be generated by Date as well.

### **DELPLUS Ver 1.0.0**

#### **Special Features**

- Software is designed and developed exclusively to work in all types of libraries.
- DELPLUS is menu driven with Graphical User Interface (GUI). It is a user-friendly tool.
- It has an effective administration and security system and provides for password both for system Administrator as well as the User.
- Follows internationally recommended formats such as MARC-21, US MARC and CCF.
- Best for smaller libraries which have collections up to one lakh holdings.
- Barcode enabled
- Reservation facility for materials.

- Online monitoring of the status of material.
- Interactive facility for maintaining library inventory/database.
- Generation of reminders and intimations to the Members.
- Generation of reminders to vendor/supplier/binder, etc.
- Advanced backup and recovery system
- Online listing of country and language information with related codes.
- Online Help system for all modules.

This software comprises Acquisition, Cataloguing, Circulation, OPAC Search, Article Indexing, Authority Control Systems, and System Administration modules.

### 3.4 *Grandhalaya*

*Grandhalaya* is an integrated software package for library Information systems designed specifically to meet all needs of general as well as special libraries by Ananth Technologies Pvt Ltd of Hyderabad. It handles large, text-intensive and unlimited number of records and provides fast access on free text searches and eases the tasks of acquisition, cataloguing, circulation and information management. It is a friendly package to both the librarians and users. It has been developed using the most advanced technologies and tools like Visual Basic HTML, DHTML, ASP and JavaScript and VBScript to make the application platform independent and portable to web browsers. It is also compatible with Oracle, MS-SQL Server, MS-Access etc. and is available for both single user and multi user environments.

**Administration Module:** It designed to create a database of unlimited number of bibliographic records on all formats of library material. This module enables libraries in book acquisition and serial control. It facilitates pre-order searching of books, the orders against available books, generation of notices to the overdue and incomplete supplies, budget allocation and status of funds available under different heads, calculation of actual and committed expenses with appropriate currency conversions, generation of accession register, etc.

**Circulation Module:** This module maintains and updates membership records. It checks the borrowers with their photo Identify through bar code scanning and prompts their loan status. It produces lists on loan, books due for return, facilitates reservation of titles, prompts over due books, calculates fines and automatically generates notices to the borrowers.

**OPAC:** The data is fully protected from the users of OPAC terminals. The module facilitates members to search Library material, based on Title, Author, Subject, Language, Key words, Accession No., Publisher, Publishing Place and Year of Publication; supports bar code scanning, photo identity, and interface with Web/Internet besides generation of a number of reports **Utilities Module** facilitates the library staff to arrange the activities such as Binding, Photocopying, Translation etc. Report on work status, periodical reports on various activities can also be taken. Stock verification possible through bar code scanner or manual entry. **Web Inquiry** allows access from the desktops to the Library and search for the Books, Articles, Journals. Demands for New Books/Journals/Audio and Video equipment to library can also be submitted from desktops.

### 3.5 LibEra

LibEra is an integrated library software product from ModelSoft Ltd, Hyderabad. LibEra has been designed from the beginning to be web-enabled. It provides multi-lingual support. It is a comprehensive solution for all kinds of libraries. It covers all basic modules. Its features include:

- It is platform independent; handles multiple libraries in an organization and virtual keyboards.
- Adheres to international standards like MARC21, AACR2R, ISO 2709 and Z39.50 v1995.
- Multiple security; specific features are authorized to the members; provides high security for data.
- Library members are continuously sent information through automatic, system-generated e-mails
- Provision for usage of wild cards and keywords in enquiry.
- Maintains SDI profiles of the entire members and users are informed about new arrivals in the library through mails.
- Users can customize the look and feel of their screens.



- Client machines only need to have a browser to access the package.

**Acquisitions** supports placing requests for new books, approvals from book suppliers, placing orders, recording invoices and other miscellaneous activities. Request for new books can be placed through Internet. **Periodicals** supports subscription receiving, renewal, binding and other miscellaneous activities. **Electronic storage** supports adding, viewing, modification of electronic storage. It also supports disposal of expired and damaged storage. **Cataloguing** helps in cataloguing of books that enter the library through acquisitions, approvals, gifts, loans or any other means.

**Enquiry** may be accessed through Internet. This feature helps in enquiry on books, periodicals and electronic storage. **Circulation** supports issue, receive, renewal, lost, reservation and lending books and periodicals. **Administration** helps in administering the whole system. It defines how the whole system should work. Here new users, suppliers and agents can be created; billing configurations, currency conversion rates, subjects, categories, designations, SDI profiles can be configured from here. **Gazette management** helps you in management of Gazettes (Government order). This also helps in maintenance of information bank of newspaper articles.

### 3.6 Librarian Suite

Developed by Soft-Aid Computers Ltd, Pune, the software contains four subsystems, viz., Librarian for integrated library management functions; Librarian Q&A, online public access catalogue; Dossier for journal article indexing, archival and retrieval; and Librarian on Web for Internet/Intranet ASP-based querying. The software is capable of working on DOS, Unix and Windows platforms including Windows NT. It can handle more than 2 lakh records and is available in multi-lingual format. It can also handle user-defined media. It is installed in some R&D, banking and public sector institutions.

### 3.7 LibSys

It is a fully integrated library management system developed by LibSys Corporation, New Delhi. It is a multi-user system capable of running on DOS, Unix, Xenix, VMS, and Windows platforms. It can be customized to suit the user needs and can be operated with other RDBMS software such as Ingress and Oracle. The LibSys 4 developed in C language is a client server implementation and provides ample flexibility in choosing operating platforms. It supports all Unix, Windows NT, Novell NetWare environments and provides graphical user interface on client side. There are options for various MARC formats and CCF. It follows ANSI Z.39.50 protocol for bibliographic search. It can handle images and multimedia. Besides the library house keeping operations, it supports article indexing, abstracts and generating CAS, SDI and bibliographies with full editing features. It has powerful search engine and Web interface for Internet/Intranet applications, options to have back-end RDBMS such as Oracle, or MS SQL.

Libraries of various public and private organizations, scientific laboratories, universities and colleges and public libraries in India use LibSys package. The LibSys software has been in operation since 1988. There are over 600 sites in different user segments throughout the country besides British Council Libraries (in South-Asian region) as well as a couple of Central American clients use the software. Many organizations have taken multiple site license of the software which include British Council Libraries, Department of Space, CSIR, ICAR, Indian Oil Corporation, IIMs and IITs.

**Acquisition Module** covers initiation of titles for ordering with options to import data to download from network or enter data including checking for duplication; placing of orders; invoice processing; accessioning; order follow-up; receiving and accessioning of free and gift items are also dealt with online queries may be made on titles, orders, invoices, vendors, and budget heads; and corresponding reports can be printed. Various reports such as approval request form, purchase orders, overdue notices, budget and expenditure analysis, payment requisition report, accession register, and bill register can be generated and printed on requirement.

**Cataloguing Module** maintains a titles in-process file of all items that are accessioned. This system covers catalogue maintenance, thesaurus construction; authority files; and holdings updates. Holding summary by a range of call numbers, and 3x5 catalog cards can be printed. It provides the facility to provide Current Awareness Services such as SDI, special bibliographies, and lists of recent arrivals. It

makes possible import/export of bibliographic data in both MARC and non-Marc formats; and automates the stock verification process

**Circulation Module** supports issue and returns, renewals, reservations and membership registration; generated and print barcoded ID Cards with the members photograph; titles on display; in circulation, and in bindery; overdue follow-up and recall facility; inter-library loans and stock verification; Query and reports facilities cover a range of statistics on both borrowers and collection, including highly reserved titles, non-circulating material, number of checkins by title/borrower, delinquency cases, etc. The system keeps a complete log of all circulation transactions.

**Serials Module** provides for new subscription ;renewal; invoice processing; budget & expenditure analysis (Kardex update); claims monitoring (including generating notices for issues 'not received', overdue, or received in a damaged condition); bindery management; recording and accessioning bound volumes; online queries on various aspects of serial control including the holdings and circulation of all periodicals.

**OPAC** provides access to the library holdings through various catalogues and indexes such as author, title, subject, and classified catalogue, publishers' index, conference place index and KWIC/KWOC indexes. Also possible are combination searches using Boolean operators that yield highly satisfying and precise results, however complex the query. OPAC also provides the facility to request acquisition of titles, to reserve materials; and to send personalized SDI, overdue/recall/collect notices and messages by e-mail. **Web OPAC** provides an advanced GUI to enable searching of the library database through an industry standard web browser such as Netscape, internet Explorer, etc.

**Article Indexing** facilitates indexing and abstracting of articles from various journals in a separate database. It includes scanning of articles, entry of citation, online searches on author, keywords/descriptors and even word-based free text searches. This system also provides periodic documentation lists, personalized SDI, bibliographies on specific subjects, etc.

### 3.8 Maitrayee

Developed for use in the CALIBNET by the CMC Ltd, Secunderabad, *Maitrayee* facilitates library computerization, resource sharing, standardization, connectivity and modularity. The project was funded by NISSAT. It has been developed on Ingress RDBMS supported by Unix platform. It is compatible with ISO-2709 and conversion from CCF to UNIMARC or vice versa is possible. Other features like bar code reading and OCR are incorporated. Apart from routine library operations the software facilitates central host and networking services including supporting protocols like TCP/IP and X.25.

### 3.9 PALMS and CLMS2

Prasad Automated Library Management Systems (PALMS) and Computerized Library Management Systems version 2 (CLMS2) are developed and distributed by the Nutan Software and Publishing, Almora. Both the software packages support most of the library routines and data conversions. They are Y2K compliant, compatible with dBase, FoxPro and word processing languages for report generation. PALMS also supports CAS, SDI and bibliographical services. Both the packages are modestly priced and are within the reach of small and medium-sized libraries.

### 3.10 Sanjay

Sanjay is developed by DESIDOC and is marketed by NISSAT. This package is an extension of CDS/ISIS capabilities through the PASCAL interface. It has a set of 70 Pascal programs and 25 special menus. It has a faster response time - 1 minute for a query on 12,000 documents. It interlinks effectively two or more databases and also handles numeric calculations. It is user-friendly for library housekeeping operations. *Sanjay* is based on CDS/ISIS ver 2.3. It is capable of interlinking two or more databases, handling numerical calculations and other house keeping operations.

The salient features of the package include Maintenance Module, User Module, Circulation Module and Online Catalogue Module. The Maintenance Module restricts the access rights as authorized by the Database Administrator. For data security and for providing selective access, the Maintenance Module is accessible to authorized users only. The User Module helps the library staff to

carry out daily routine and assist the library users in circulation control, acquisition control, online catalogue and serials control. The Online Catalogue Module is interlinked to the circulation, acquisition and cataloguing activities. The major databases linked by it include books database, members database, acquisition database, vendors database, budget database and serials database. Any standard PC available nowadays can be used to run this software.

### **3.11 SLIM++**

System for Library Information Management (SLIM) is a library software package from Algorithms, Pune. SLIM++ is an integrated, multi-user, multitasking library information software for the Windows environment. It helps the librarian catalogue books, films, sound recordings, drawings, clippings, articles, reports, letters, pamphlets, serials publications etc. SLIM++ cataloguing adheres to popular international standards. One can share data with others effectively. Retrieval of the data is simple, fast and efficient. It has Cataloguing, Circulation OPAC, Acquisition Serials Control, Web Based OPAC, Bulletin Printing (CAS), Statistical Analysis, Export/Import in CCF/MARC, DBridge, Z39.50 server modules.

SLIM is widely used by many schools, colleges, research institutes, public libraries, corporate houses, etc. SLIM is upgraded continuously to meet the technological advances in the field of data storage, retrieval, user interaction and communications. SLIM++, highly revised version, has been introduced in May 2001. SLIM++ is user friendly, menu driven, and highly interactive software. To operate SLIM no prior knowledge of computers is required. On-site training and high quality reference manuals ensure smooth transition from the current computerized or manual system to SLIM (Vyasamurthy, 2001).

#### **General Features**

- Minimal data entry, pick-up lists during data entry, validation and integrity checks
- Bar code support with multimedia links
- Browsing your library information through the Internet/Intranet
- Multi-script/multi-fonts
- Variable length fields/records, Packing/purging records
- Existing data conversion to SLIM++
- Optional customized retrospective data entry and data capture
- Multiple selection criteria for reports

#### **Windows Features**

- Adherence to Windows standards with menu bar, taskbar, window resizing, window moving, multi-tasking using simultaneous operations in multiple windows.
- Point and click reduces users learning curve.
- Drag and drop, cut and paste reduce data entry efforts and increases uniformity and accuracy of the data.
- Wizard mode for beginners; to formulate search query, users need not remember steps.
- Online help /tool tips.
- Use of Windows standards dialogues for saving, opening and search in.
- Use of rich text format for user specified fonts, colors and sizes.
- Multi-media links to drawings, sounds, scanned files, web sites etc.
- Interface with standards Windows applications like Wordpad, MS-Word, Mail Exchangers, etc.

### **3.12 SOUL**

University libraries are complex entities, having large collections and serving a huge clientele. To carry out various operations in a university library effectively, there is a need for automation. Keeping in view the latest trends in information technology, INFLIBNET Center has developed a Windows-based library management software SOUL (Software for University Libraries), which provides total solution for library automation. SOUL is designed using client-server architecture, which imparts extra strength to storage capacity, multiple access to single database, various levels of security, back up, and storage facilities etc. This software has been designed after a comprehensive study of different

library-related functions practiced in university libraries. It has MS-SQL Server 6.5 RDBMS as the back end. This user-friendly software is quite easy to work with. The software comprises Acquisition, Catalogue, Circulation, OPAC, Serial Control, and Administration modules.

The in-built network feature of the software will allow multiple libraries of the same university to function together as well as access to the distributed databases installed at various university libraries and union catalogue mounted at INFLIBNET using VSAT network. Other features include availability at nominal cost to university libraries, software designed and developed exclusively to work under university environment, network feature of the software will allow multiple libraries of university to function together, exhaustive training at INFLIBNET supported by comprehensive manual, on-site training and free updation/modification, free technical assistance and following standard formats such as CCF, AACR2, and LCSH.

**Acquisition:** The Acquisition module enables library staff to handle major functions related to acquisition of library material including Suggestions management, Ordering cancellation and reminders, Receiving, Payment including fund control, Master file management such as currency table, vendors, publisher, user etc. Through this module library staff can search the entire database of library holdings for the purpose of duplicate check etc. Using various combinations, number of reports could be generated.

**Catalogue:** This module is used for retrospective conversion of books, technical processing of books received from Acquisition Section, printing a range of records for verification, searching by title and accession numbers, authority files for publishers etc. One of the unique features of SOUL is accessing to authority files on screen as well as selection box in various fields of records. Once the proposed VSAT Network by INFLIBNET is commissioned this module will take care of automatic replication of data into union catalogue. This will avoid exchange of library data on physical media i.e. floppy, tape etc. This module covers Cataloguing Process, Catalogue Search, User Services, Catalogue card generation, Authority file maintenance, Retro conversion, Stock verification, Report Generation, Union database maintenance (local level), and Export/Import of records.

**Circulation:** This module will take care of all possible functions dealt in a university library setup. Starting from membership management, maintenance of status of library items can be handled using SOUL. The circulation transactions viz. issue, return, renewal, reserve, recall, hold can be successfully done. The complex functions like fine management for each category of user and material-wise can also be effectively managed. Inter library loan, searching the status of every member or library item is possible. Reminders for overdue material, generation of various reports have also been covered.

**OPAC:** The Online Public Access Catalogue (OPAC) of SOUL is a window to the library collection. Using the user friendly menus, user can search for an item available in the library by author, title, corporate author, conference name, subject descriptors, class number etc. The Boolean search enables the user to conduct the search using all combinations including type of material, language, year etc. Besides, this will serve as first point of information about the library and also gateway for accessing INTERNET, union databases, or any other external sources.

**Serial Control:** The complex job of keeping track of serials can easily and effectively be handled using SOUL through its Serial Control module. This module broadly handles Suggestions, Subscription (renewal and new subscription), Payment including fund control etc., Check in of issues including prediction of issues arrival, Reminder generation, Binding management, Search status of every item, Master database management, Reports generation etc. User administration facility module is used for creating new users and giving them right for accessing different modules.

### **3.13 Suchika**

It is an integrated software package, exclusively developed by DESIDOC for use by the Defence Science Library (of DESIDOC) and other libraries/technical information centres of the Defence R&D Organization (DRDO). One of the objectives was to follow uniform standards for creating Holdings Database of DRDO Libraries and to help automate the DRDO libraries. Initially, *Suchika* was developed in C++ language on MS-DOS and Unix, and version 2 on Windows NT platform. The software conforms the CCF, AACR2 and ISO-2709 and allows data conversion from CDS/ISIS, dBase and FoxPro through application programmes. It is Y2K complaint.

The software has powerful search facilities. *Suchika* version 2 offers many new facilities over the previous version. Apart from Y2K compliance and supporting all library routines, the software has capabilities to interface with Web/Internet. One can search the OPAC, which is hosted on the Web, and download information. Alternatively, DESIDOC can send downloaded files (against a query) through e-mail, which is provided for in *Suchika* version 2. Another unique feature is adding titles and abstracts of serials received to generate CAS, SDI, Current Additions (books and periodicals) and generating catalogue of bound volumes (for individual libraries) or union catalogue (for a group of libraries). The databases can be converted to CD-ROM. It facilitates duplicate checking also. Comtek Computers Pvt. Ltd., the developer (for DESIDOC) of *Suchika*, markets a variant of this software under the trade name Troodon.

### 3.14 Virtua ILS

Virtua Integrated Library System is a comprehensive, integrated library software package from VTLS Inc, Virginia, USA. It has the modules of Acquisition and Fund Management, Circulation, Cataloging, Serials Control etc. There are several features that are unique to VTLS Virtua ILS (Vyasamurthy, 2001).

- It is fully parameterized software: User library can configure the setting to its maximum flexibility.
- It adopts UNICODE and as a result can support number of language fonts not normally supported by others.
- ILS has Z39.0 built into the software. As a result, ILS users can reach external library catalogs easily and conduct searches. Converse is also true, if other libraries permit access to reach external databases. [For information on Z39.50.
- There is a powerful language editor to input records in different languages.
- It has provision for RFID tags and labels (see note below on RFID)
- It comes with a Chameleon Gateway: With the help of this gateway, the user's screen can be customized according to his needs.
- It has an exhaustive statistics and reporting module.
- It comes with heavy security possibilities: Security of access can be monitored at user, user Group, patron, patron group and location library levels. Depending upon security rights granted to you, the tool bar on your screen contains only those icons that are usable by you.

*A Note on RFID Technology:* RFID stands for Radio Frequency Identification. labels, which are as thin as paper, contain electronic chip, embedded with details of the patron, accession number of a book etc. These are pasted onto books, user's cards etc. RFID sensing devices 'read' these RFID labels or Tags remotely from a distance, that is, no line of sight positioning of the reader is needed. As a result, a number of advantages arise.

- Stock verification and inventory control could be carried out using hand held reading devices. Just wave the reader across the shelf, all accession numbers are read in.
- Theft detection is possible if a reader is fitted to the exit door. When a user unauthorizedly takes out a book, RFID scanner detects it and raises an alarm.
- Unmanned self-service counters can be maintained for checking in and checking out books. After scanning incoming books, software automatically "cancels" the issue.
- Identification of misplaced items will become easy.
- Greater availability of books because wrong shelving can be avoided and corrected.
- It leads to greater efficiency and productivity in library.

New Hanovar County Public Library in North Carolina has started using RFID technology from January 2001. In Hyderabad, the Central University of Hyderabad has procured Virtua ILS for automating their Digital Library.

## 4. DEVELOPMENT OF DATABASES

Although database industry in India is of recent origin (Vyasamurthy, 1995), it had roots in 1970s when India participated actively in many international database initiatives, especially those promoted by the UN like INIS, AGRIS and FOSTIS. In addition, many of the libraries and information

centres in the S&T, research and academic institutions have been using both printed and online versions of foreign bibliographic databases since more than a decade. However, serious efforts in the development of bibliographic databases in the country were started only in the late 1980s. INSDOC and NASSDOC took initiative in this direction with the development of *National Union Catalogue of Scientific Serials in India* (NUCSSI) and *Union Catalogue of Social Science Periodicals*, respectively. During this period, NISSAT provided thrust to the development of indigenous databases on machine tools, leather, food, drugs and pharmaceuticals, textiles, chemicals, and ceramics. In recent times (1990s), DESIDOC took active role in the development of market for the creation of bibliographic databases. Largely due to its role of training the trainers, many institutions, especially professional associations in New Delhi, were able to develop expertise in taking up bibliographic database creation projects.

Various factors which led to the interest in the databases in the country include (i) the government's liberalization policies which led to an awareness of information as an indispensable resource for industrial growth, (ii) growth in the telecommunication and data networks, (iii) penetration of computers in every sphere of activity, and (iv) the introduction and popularization of various information services and products like online services, bulletin boards, and value added reports.

An international conference on the subject was organized by DESIDOC, which has provided momentum to these efforts. In 1990, a publication brought out (NMIS, 1990) by the National Management Information System (NMIS) of DST listed 89 databases in S&T developed by 58 government, public and private sector agencies. A majority of these databases were in computerized form, with a few in non-computerized form. The recent Indian Abstracting and Indexing Services and Databases in Science and Technology (INDAB2) compiled by NISSAT (Sur and Sunder Singh, 1997) lists 398 entries, an increase of 105 entries over the earlier edition (Sur and Sunder Singh, 1995). All the 113 databases, 45 out of 202 abstracting and indexing (A&I) services and 43 out of 83 directories are machine-readable databases. In all there were 201 machine-readable databases. These databases are developed/produced by as many as 177 agencies, which include 38 government departments, 72 R&D organizations, 48 academic institutions and universities, and 19 from private sector. However, most of the databases (more than 80 per cent) fall in science and technology and the rest are in social sciences, management, business, industry, etc. Some of these databases are available on CD-ROM. Only one is available through international vendors.

At present financial and business information is the focus of many successful commercial database developers and databases for merchant bankers, investors, corporate entrepreneurs, and financial analysts dominate the commercial scene with a couple of databases being provided online (for example, JURIX and BISNET). It is expected that the trend is likely to improve further in the next decade. Many databases are the result of transformation from print form to floppy diskettes, which now are slowly migrating to CD-ROMs. Some of the important database vendors are (Vyasamurthy; 1995):

**BISNET:** The Business Information System Network (BISNET) of the Federation of Indian Chambers of Commerce and Industry (FICCI) focuses on Indian business and industry. It provides comprehensive information on government policies, domestic and foreign business news, industry profiles, bibliographic database of books and journals, and the Kompass India Business Directory comprising 70,000 addresses. Online access is provided through PSTN lines or I-Net.

**CIMM:** The Corporate Information on Magnetic Medium (CIMM) service of the Centre for Monitoring Indian Economy (CMIE) provides access to information on economic intelligence, Indian economy and industry. CMIE possess voluminous databases running to a few GB. The databases are also accessible through Dialog.

**DataServe of BI Infotech:** A subsidiary of *Business India* group, offers databases related to stock market, foreign exchange, money and commodity markets, and other general interest databases like Business India, Express Computer, Computer Mart, etc. These databases are available through I-Net. On subscription, one can access these databases, as well as use the e-mail service, aXcess which in turn can reach Internet e-mail addresses. DataServe has a subscriber base of more than 3000 and around 10,000 e-mail users.

**India Online :** A subsidiary of Dataline and Research Technologies (India) Ltd. (DART), it offers e-mail under the brand name DARTMAIL. India Online has its own network linking Ahmedabad, Bangalore, Calcutta, Chennai, Delhi, Hyderabad, Mangalore and Mumbai. It provides real-time access to corporate

financial and performance data of about 5000 companies. The database is also available on CD-ROM with monthly updates. It also provides access to external databases like the legal database, JURIX.

**Informatics India (P) Ltd :** The Bangalore-based firm is one of the most successful firms offering library services including databases of Dialog. The firm has been supplying the CD-ROM databases of Silver Platter. Of late it started mastering and producing databases on CD-ROM, using the WinSPIRS retrieval software of Silver Platter. The firm produced many databases on CD-ROM, on turnkey basis. Some of them are MTech on CD database for the Central Manufacturing Technology Institute, Catalogue of DRDO Library Holdings (on CD) for DESIDOC and the Indian Business Inside Database (IBID) on CD.

**Legal Databases :** JURIX, India's legal database, covers Civil Procedure Code, legislative acts like, Arbitration Act, Company Acts, Excise and Customs Acts, Transfer of Proprietary Act, High Court and Supreme Court decisions on direct taxes, and MRTP Case Laws. There are 12 databases, most of which cover information from 1981. It is available online with user-friendly search software through India Online. The Judgment Information System (JUDIS) is an online database of case law information for judges, lawyers, law students, libraries and the litigants. The database, part of the Court Information System (COURTIS) offered by the NIC, is accessible by NICNET terminals in all the district headquarters.

## 5. ADVANTAGES OF LIBRARY AUTOMATION

Many activities of a library are routine in nature; a few are repetitive. Automation of these activities helps in managing the library's resources in a better way at the same time saving time, money and manpower. For example, once the bibliographic details like author, title, edition, publisher, price, ISBN number, etc are entered at the time of ordering, the same data can be used for accessioning, cataloguing (OPAC), and circulation. Other important factors associated with automation are speed, and accuracy. One can imagine the time saved in literature searches and in preparing bibliographies. Automation also offers freedom from doing repetitive and routine works as well as enables providing efficient services properly and more efficiently cutting down time and improving productivity.

Automation also facilitates generation of a number of reports for better decision making in the effective management of the library. Availability of various statistical and other usage reports and performance reports will ensure better appreciation from library users. For example, vendor performance analysis is possible. Subject-wise or project/department-wise budget can be monitored. Circulation data can provide information on titles that are in great demand so that more copies can be procured if needed. Many current awareness services like current additions, contents of books and journals, etc can also be provided to users.

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## Appendix 1: Some of the library software packages available in India

Software package	Developing/Marketing agency
ACQUAS, ASCAT, ASCIR, ASIR, SEARS	Ober Information Systems, Calcutta
Alice for Windows	SoftLink Asia P Ltd., New Delhi
Archives	Microfax Electronic Systems, Mumbai
Basis Plus/Techlib Plus	NIC, New Delhi
CATMAN	INSDOC, New Delhi
CDS/ISIS/WINISIS	Unesco (distributed by NISSA, New Delhi)
CLMS2	Nutan Software & Publishing, Almora
DELSIS	DELNET, New Delhi
Golden Libra	Golden Age Software Technologies, Mumbai
<i>Grandhalaya</i>	Ananth Technologies, Hyderabad
<i>Granthalaya</i>	INSDOC, New Delhi
Krugar Library Manager	Blitz Audio Visuals, Pune
LIB-AMS	Supertech Software, New Delhi
Libman	Datapro Consultancy Services, Pune
LibEra	ModelSoft Limited, Hyderabad
Libra	Ivy Systems, New Delhi
Librarian Suite	Soft-Aid Computers, Pune
Library Management	Raychand Sysmatics, Bangalore
Library Manager	System Data Control, Mumbai
Libris	Frontier Software Technology, Hyderabad
LibSoft/Librarian	ET&T, New Delhi
LibSys 4	LibSys Corporation, New Delhi
Loan Soft	CompuTek Computer Systems, Hyderabad
<i>Maitrayee</i>	CMC, Secunderabad (for CALIBNET, Calcutta)
MECSYS	MECON, Ranchi
NILIS	Asmita Consultants, Mumbai
NIRMALS	Nirmal Inst. of Computer Expertise, Tiruchirapalli
PALMS	Nutan Software and publishing, Almora
Salim	Uptron India, New Delhi
Sanjay	DESIDOC, Delhi (for NISSAT, New Delhi)
SLIM++	Algorithms, Pune (marketed : Informatics India, Bangalore)
SOUL	INFLIBNET Centre, Ahmedabad
<i>Suchika</i>	DESIDOC, Delhi
TeleLib	Tata Infotech, Mumbai
Troodon	Comtek Computers, New Delhi
TULIB	Tata Unisys, Mumbai
Ulysis	Wipro Information Technology, Secunderabad
Wilsys	Wipro India, Bangalore
Virtua ILS	VTLS Software P Ltd., Noida, (UP)